ORIGINAL RESEARCH PAPER
Volume - 15 | Issue - 04 | April - 2026 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

AT THE CROSSROADS OF ADDICTION AND NEURODEGENERATION: OCCUPATIONAL THERAPY IN A NEUROCOGNITIVE CASE STUDY

Occupational Therapy

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ABSTRACT

Chronic Alcohol Use Disorder (AUD) contributes to neurodegeneration, thiamine deficiency, and cerebrovascular injury, increasing the risk of early-onset dementia. When compounded by ischemic stroke, morbidity and mortality rise due to reduced cognitive and physiological resilience (Ridley et al., 2013; Harper, 2009). This case study presents occupational therapy evaluation and intervention for a 42-year-old male with long-standing AUD, alcohol-related brain damage, and a subacute bilateral midbrain infarct. The client exhibited impairments in functional cognition, executive function, emotional regulation, and right-hand motor coordination, affecting instrumental activities of daily living (IADLs) and routine management (Toglia et al., 2014). A three-month, client-centred occupational therapy program integrating cognitive rehabilitation, graded motor retraining, and Virtual Reality/Augmented Reality–based IADL re-engagement was implemented (Laver et al., 2017). Intervention strategies included cognitive strategy training to improve attention and sequencing (Goverover et al., 2018), task-oriented motor retraining for upper-limb coordination (Lang et al., 2009), emotional regulation techniques for stress management (Brown et al., 2011), and caregiver-supported routine structuring to promote carryover (Gitlin et al., 2010). Post-intervention, the client demonstrated improvements in attention, sequencing, volition, emotional stability, and daily participation. Family-centred care facilitated adherence and functional generalization within the home environment (Gitlin et al., 2010). Prognosis remains fair, contingent upon continued therapy, consistent routines, and sustained caregiver involvement.

KEYWORDS

Alcohol-Related Brain Damage; Dementia, Midbrain Infract, Neuropsychiatric Occupational Therapy, Family-centered Care.

INTRODUCTION

Dementia is a leading cause of global cognitive decline and may result not only from neurodegenerative processes but also from secondary conditions such as alcohol-related brain damage (ARBD). Chronic alcohol consumption disrupts frontal–subcortical circuits responsible for executive functioning, attention, impulse control, and behavioural regulation, leading to progressive cognitive and functional impairment (O'Brien & Thomas, 2015). Individuals with long-standing Alcohol Use Disorder (AUD) are particularly vulnerable due to the combined effects of neurotoxicity, thiamine deficiency, and heightened cerebrovascular risk, often resulting in alcohol-related dementia or vascular cognitive impairment (Ridley et al., 2013).

Cerebrovascular insults further exacerbate decline in this population. Although uncommon, midbrain infarcts can produce complex cognitive, emotional, and motor impairments due to the midbrain's role in arousal regulation, executive neural pathways, and motor control (Kwon et al., 2014). The coexistence of alcohol-related neurocognitive impairment and stroke frequently leads to marked deficits in functional cognition, emotional regulation, and instrumental activities of daily living (IADLs), necessitating comprehensive rehabilitation.

Occupational therapy plays a pivotal role in promoting participation and functional recovery in individuals with acquired neurocognitive conditions. Guided by the Occupational Therapy Practice Framework (OTPF–4th edition), occupational therapists evaluate the interaction between client factors, performance skills, habits, routines, and environmental contexts to develop individualized, occupation-based interventions (AOTA, 2020). Evidence supports integrative approaches combining cognitive rehabilitation, motor retraining, emotional regulation strategies, and family-centred care to improve functional performance and participation in individuals with complex neuropsychiatric presentations (Bendixen & Mann, 2008; Toglia, 2018; Robertson & Murre, 1999).

This case is clinically significant due to the rare co-existence of Alcohol Use Disorder, Dementia, and Midbrain Infarction, resulting in a complex neurocognitive and functional presentation. While these conditions are often studied independently, limited literature explores their combined impact on cognition, behaviors, and daily functioning. This report highlights the role of occupational therapy within a multidisciplinary rehabilitation approach in addressing neurocognitive deficits, functional impairment, and relapse prevention in such complex clinical presentations.

CASE PRESENTATION:

This case study presents the occupational therapy evaluation and intervention of a 42-year-old male has a 15-year history of chronic alcohol consumption, with escalation to both morning and night intake, leading to alcohol-related brain damage and progressive cognitive decline with subsequent development of dementia. In March 2025, he later sustained an ischemic stroke involving the artery of Percheron, followed by a thalamic infarct, resulting in memory loss, confusion, slowed responsiveness and further worsening of cognitive impairment following this was admitted to G.S.M.C. & K.E.M. Hospital.

The report highlights the client's functional impairments in cognition, emotional regulation, and motor performance; the structure and rationale of an integrated occupational therapy intervention program; and functional outcomes observed over a four-month rehabilitation period. The case underscores the therapeutic value of integrated cognitive–motor rehabilitation and family-centred care in promoting recovery, independence, and meaningful occupational engagement.

MATERIALS & METHODS:

Study Design: A single-case, pre–post intervention design was utilized to evaluate the impact of a structured neuropsychiatric occupational therapy program on cognitive, motor, emotional, and occupational performance outcomes over a period of 4 months.

OCCUPATIONAL THERAPY TREATMENT

A top-down, client-centred, and occupation-based approach was adopted for the occupational therapy evaluation and intervention in this case. The evaluation focused on identifying meaningful occupational performance issues and understanding how underlying impairments influenced participation. The client was systematically evaluated across the following domains:

- Occupational performance, including self-care, instrumental activities of daily living (IADLs), roles, and routines
- Causes of occupational dysfunction, encompassing neurological, cognitive, emotional, and behavioural contributors
- The five domains of the Occupational Therapy Practice Framework—4th edition (OTPF-4TH Edition):

occupations, client factors, performance skills, performance patterns, and contexts/environments

- Standardized Assessments to evaluate functional cognition, emotional regulation, and motor performance
- Selection of appropriate Frames of Reference (FOR's)

- Development of an individualized intervention plan aligned with client goals and contextual demands (American Occupational Therapy Association [AOTA], 2020)

Occupational therapy evaluation and intervention were guided by an integrated application of multiple Frames of Reference to address the client's complex neuropsychiatric and functional impairments. The Model of Human Occupation (MOHO) was used as the primary framework to understand disruptions in volition, habituation, performance capacity, and environmental interaction affecting occupational engagement (Kielhofner, 2008).

Cognitive Rehabilitation principles guided interventions targeting attention, executive functioning, and sequencing deficits through structured, graded, and task-specific activities to support functional cognition (Toglia, 2018). Occupational therapy–informed cognitive–behavioral strategies were embedded within functional tasks to address emotional dysregulation and stress intolerance, focusing on adaptive coping and emotional regulation rather than formal psychotherapy (Beck, 2011; Brown et al., 2011).

The Occupational Adaptation Frame of Reference promoted adaptive responses and role competence in daily occupations (Schkade & Schultz, 1992). The Rehabilitation Frame of Reference addressed motor impairments through task-oriented strengthening and neuromuscular re-education to enhance functional independence (Pedretti & Early, 2020).

Occupational Therapy Intervention:

A structured, goal-oriented occupational therapy program was implemented over four weeks. All intervention goals were formulated using the SMART (Specific, Measurable, Achievable, Relevant, and Time-bound) framework, and individualized outcomes were measured using Goal Attainment Scaling (GAS) to capture meaningful functional change beyond standardized scores (Kiresuk & Sherman, 1968; Toglia, 2018).

Attention and working memory were addressed through graded cognitive activities that progressively increased task duration and complexity, supported by mental pacing strategies and caregiver-led environmental modification to reduce distractions (Toglia, 2018).

Executive functioning deficits were targeted using task-breakdown training, sequencing cards, problem-solving worksheets, and Virtual Reality–based IADL simulations to practice multi-step activities such as dressing and meal preparation with reduced verbal cueing (Laver et al., 2017).

Right-hand dexterity and grip strength were improved through pegboard tasks, functional grasp training, weight-bearing exercises, and occupation-based activities such as dough preparation, supported by a structured home-based fine motor routine (Lang et al., 2009; Pedretti & Early, 2020).

Volition and motivation were enhanced using activity-choice boards and graded engagement strategies guided by the Model of Human Occupation, with family-supported routine structuring (Kielhofner, 2008).

Instrumental ADLs were addressed through Virtual Reality–based home-management tasks and environmental simplification (Laver et al., 2017). Emotional regulation was supported through occupational therapy–informed cognitive–behavioural strategies, including breathing exercises, progressive muscle relaxation, and grounding techniques (Beck, 2011; Brown et al., 2011). Weekly caregiver education promoted adherence and functional carryover (Gitlin et al., 2010).

Coping Strategies and Relapse Prevention Techniques for Alcohol Use Control were addressed to support the patient in controlling alcohol use and maintaining abstinence. Cognitive-behavioural approaches were integrated within occupational therapy intervention to help the patient identify high-risk situations, recognize triggers, and develop adaptive coping responses to manage cravings and prevent relapse. Occupational therapy in mental health frequently incorporates cognitive-behavioural strategies to improve insight, behavioural regulation, and adaptive coping in individuals with substance use disorders and related psychosocial conditions (Brown, Stoffel, & Munoz, 2019; Creek, 2010). According to the cognitive-behavioural relapse prevention model, relapse often occurs when individuals encounter high-risk situations without adequate coping strategies, combined with positive expectations regarding alcohol use (Marlatt & Donovan, 2005). Therefore, psychoeducation and cue-management strategies were implemented, including minimizing exposure to alcohol-related contexts that could trigger cravings and increase the risk of relapse, along with restructuring daily routines to promote healthier behavioural patterns. Additionally, urge-management techniques such as mindfulness-based awareness and "urge surfing" were introduced to help the patient observe and tolerate cravings without acting upon them (Bowen et al., 2014). Engagement in structured, meaningful occupations and the development of alternative coping mechanisms were also emphasized to enhance self-efficacy, support behavioural regulation, and reduce the likelihood of relapse, consistent with occupational therapy approaches to recovery and lifestyle restructuring (Brown et al., 2019; Creek, 2010).

ASSESSMENTS PERFORMED
(Pre & Post Intervention) :

1. Mini-Mental State Examination (MMSE)
2. Montreal Cognitive Assessment (MoCA)
3. Volitional Questionnaire (VQ)
4. Behavior Rating Inventory of Executive Function – Adult Version (BRIEF-A)
5. Occupational Self-Assessment (OSA)

Interpretation of assessments performed:

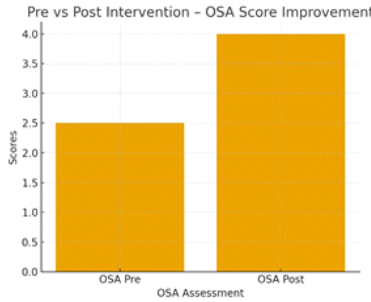
Pre-intervention findings indicated significant disruption in functional cognition, volition, executive functioning, emotional regulation, and community participation, consistent with alcohol-related neurocognitive impairment compounded by a bilateral midbrain infarct. Reduced MMSE and MoCA scores reflected impairments in orientation, attention, memory, and executive functioning, which functionally manifested as difficulty initiating tasks, sequencing activities, and managing instrumental activities of daily living.

Following a four-month, occupational therapy intervention, improvements in global and higher-level cognitive scores indicated enhanced cognitive processing efficiency and executive integration, supporting improved engagement in daily routines. Gains in volition, reflected by progression from passive to spontaneous engagement on the Volitional Questionnaire, demonstrated improved intrinsic motivation and self-initiated participation, facilitating greater role resumption and routine consistency.

Figure 1(a): Simulated task-based activity conducted collaboratively with a peer to facilitate cognitive challenge and promote process skills, executive functions, social interaction, and problem-solving during intervention.

Improvements on the Behavior Rating Inventory of Executive Function – Adult Version (BRIEF–A) suggested enhanced behavioural regulation and metacognitive control, particularly in working memory, cognitive flexibility, and inhibitory processes. Functionally, these gains were reflected in increased task persistence, reduced impulsivity, and improved self-monitoring during occupational performance. Enhanced emotional regulation, observed through occupational therapy–based cognitive–behavioural strategies, reflected improved stress tolerance and adaptive coping during task engagement. Functional improvements generalized beyond the clinic, as demonstrated by increased independence in virtual reality–based community simulations, indicating improved spatial orientation, task sequencing, and readiness for real-world community participation.

Figure 1(b).: A comparative bar chart demonstrating improvement in Occupational Self-Assessment (OSA) scores following intervention.



The OSA score improved from 2.5 pre-intervention to 4.0 post-intervention, reflecting enhanced self-efficacy, volition, and satisfaction with daily activities. These gains indicate meaningful improvement in occupational participation.

Overall, the findings suggest that an integrated, client-centered occupational therapy approach facilitated recovery across cognitive, emotional, and functional domains, resulting in improved independence and participation

Figure 2 (a) Visual Checklist for recalling routines, habits.

Figure 2(b): The patient is independently using a visual checklist to recall and sequence his daily routine and activities. As observed, he was able to perform self-care, specifically shaving, without requiring verbal prompts. This activity is carried out reliably every one specific day of the week, demonstrating improved independence and adherence to daily occupational tasks. (Improvement noted post 6 weeks of O.T. Intervention)

Figure 3: The image shows the client performing a Virtual Reality-based simulated shopping Instrumental-Activities of Daily Living task using a head-mounted display and controllers. This occupation-based intervention was used to enhance executive functions (planning, sequencing, attention, and decision-making) and support safe community re-engagement and return to functional occupations.

DISCUSSION

This case study demonstrates the effectiveness of a holistic, multi-framework occupational therapy (OT) approach in addressing the complex needs of an individual with Chronic Alcohol Use Disorder–related dementia and a bilateral midbrain infarct. The client presented with impairments in executive functioning, functional cognition, right-sided weakness, emotional regulation, and instrumental activities of daily living (IADL) participation, consistent with alcohol-related neurocognitive disorders compounded by cerebrovascular pathology (O'Brien & Thomas, 2015; Sachdeva et al., 2021).

Interventions grounded in the Model of Human Occupation (MOHO) targeted volition, habituation, and environmental influences, resulting in improved motivation, routine engagement, and occupational participation (Kielhofner, 2008). Cognitive rehabilitation strategies such as task sequencing, graded cueing, and errorless learning supported improvements in attention, planning, and working memory, facilitating functional skill transfer (Levine et al., 2011; Toglia, 2018).

Emotional dysregulation was addressed through occupational therapy–informed cognitive–behavioural and mindfulness-based strategies, enhancing coping, emotional regulation, and attentional control (Beck, 2011; Kabat-Zinn, 2003; Brown & Ryan, 2003). Motor impairments were managed through task-oriented motor retraining and neuromuscular re-education (Langhorne et al., 2011). Virtual Reality–based IADL simulations and family-centred care supported functional generalization and independence (Laver et al., 2020; Gitlin & Hodgson, 2015).

CONCLUSION:

This case reinforces the role of Occupational Therapy as a core component of Neuropsychiatric rehabilitation, demonstrating that integrated, occupation-centred interventions can effectively address functional cognition, emotional regulation, volition, and motor performance in individuals with co-occurring Chronic Alcohol Use Disorder and dementia following cerebrovascular injury. Guided by the Occupational Therapy Practice Framework (OTPF-4th edition), the use of multi-framework, client-centred approaches enabled meaningful gains in IADL participation and daily routines despite the progressive nature of the condition (American Occupational Therapy Association [AOTA], 2020).

The findings highlight the clinical value of combining cognitive rehabilitation, MOHO-based motivational strategies, OT-based cognitive–behavioural techniques, and task-oriented motor retraining to promote functional independence and participation in complex neuropsychiatric presentations (Kielhofner, 2008; Toglia, 2018; Pedretti & Early, 2020). Furthermore, the incorporation of technology-assisted IADL simulations supported real-world skill transfer and community re-engagement, while family-centred care enhanced adherence and carryover into home contexts (Laver et al., 2017; Gitlin & Hodgson, 2015).

Clinically, this case underscores that occupational therapists are uniquely positioned to deliver holistic, evidence-based, and contextually grounded interventions that bridge cognition, emotion, motor performance, and occupation, thereby improving participation and quality of life in individuals with complex dual-diagnosis neuropsychiatric conditions.

Patient's wife feedback from the treatment:

"The patient's wife reported that before receiving Occupational Therapy, he had difficulty recognizing familiar people, often failed to identify close relatives, and frequently became confused. He repeatedly asked the same questions due to poor memory and needed constant prompts to complete even simple daily tasks. Over time, he also struggled with poor sleep. She now observes clear improvement—he recognizes people more easily, remembers tasks without repeated reminders, completes activities in a single attempt, and his sleep quality has significantly improved."

Patient's Verbatim:

"This year, for the first time, we as a family celebrated Diwali together. Every year earlier, I used to drink alcohol, and because of that, we were never able to celebrate festivals properly. But after the occupational therapy sessions this year, everything felt different—calmer, more balanced, and truly good and I'm able to perform activities without getting frustrated, Thank-you."

INFORMED WRITTEN CONSENT

Informed written consent was obtained from the patient's legal guardian for participation in the intervention and for the inclusion of anonymized data in this report.

Declaration by Authors Acknowledgement:

The authors express their profound gratitude to the multidisciplinary teams of the Neurology and Psychiatry Departments at Seth G.S.M.C. & K.E.M. Hospital for their timely referrals and collaborative support throughout the rehabilitation process. Sincere appreciation is extended

to the Occupational Therapy Neuro-Rehabilitation OPD team at O.T.G.S.M.C. & K.E.M. Hospital for their support in facilitating regular follow-ups of the patient at Occupational Therapy Psychiatry OPD. The authors are especially grateful to the patient and his family—particularly his wife and children—for their consistent involvement, adherence to therapy, and vital support in the patient's functional recovery.

Source of Funding: None.
Conflict of Interest: The authors declare no conflict of interest.

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